

INTERNATIONAL SEARCH REPORT

national Application No

EP2004/009685

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 C22B19/04 C22B5/16 C22B9/22 C22B4/08 C22B13/02

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 C22B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 942 023 A (BITLER JOHN A ET AL) 24 August 1999 (1999-08-24) abstract; figure	10, 11
X	DATABASE WPI Section Ch, Week 198223 Derwent Publications Ltd., London, GB; Class M25, AN 1982-47597E XP002310971 & SU 855 040 B (GEL V I) 15 August 1981 (1981-08-15) abstract	10, 11
A	US 4 415 356 A (VICTOROVICH GRIGORI S ET AL) 15 November 1983 (1983-11-15) claims 1-2; example II	1-9

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents:

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

- *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- * & * document member of the same patent family

Date of the actual completion of the international search

16 December 2004

Date of mailing of the international search report

21/01/2005

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INTERNATIONAL SEARCH REPORT

International Application No

PCT/EP2004/009685

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4 521 245 A (KUUR VYACHESLAV P ET AL) 4 June 1985 (1985-06-04) abstract; examples	1-9
A	US 4 519 836 A (ABDEEV JURY M ET AL) 28 May 1985 (1985-05-28) abstract	1-9
A	US 4 571 260 A (JOHANSSON LEIF ET AL) 18 February 1986 (1986-02-18) column 4, lines 5-21 and 30-37	1-9
A	DATABASE COMPENDEX 'Online! Engineering Information, Inc., New York, NY, US; DE SCHEPPER A: "Liquid-liquid extraction of germanium by LIX-63" XP002260042 Database accession no. EIX78110005759 abstract & CHLORIDE HYDROMETALL, INT SYMP, PROC, 26 September 1977 (1977-09-26), - 28 September 1977 (1977-09-28) pages 357-384, Brussels, Belgium	7

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/EP2004/009685

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 5942023	A	24-08-1999	NONE	
SU 855040	B	15-08-1981	SU 855040 A1	15-08-1981
US 4415356	A	15-11-1983	GB 2088413 A	09-06-1982
			AU 542097 B2	07-02-1985
			AU 7637481 A	06-05-1982
			BE 890872 A1	15-02-1982
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			GB 2089375 A	23-06-1982
			JP 1052454 B	08-11-1989
			JP 1568824 C	10-07-1990
			JP 57104635 A	29-06-1982
US 4521245	A	04-06-1985	NONE	
US 4519836	A	28-05-1985	NONE	
US 4571260	A	18-02-1986	SE 440918 B	26-08-1985
			AU 565803 B2	01-10-1987
			AU 3732385 A	15-08-1985
			CA 1233027 A1	23-02-1988
			DD 234444 A1	02-04-1986
			EP 0153914 A1	04-09-1985
			ES 8602958 A1	16-03-1986
			IN 162085 A1	26-03-1988
			JP 60187635 A	25-09-1985
			MA 20344 A1	01-10-1985
			PL 251868 A1	05-11-1985
			SE 8400625 A	08-08-1985
			ZA 8500383 A	25-09-1985

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY (PCT Rule 43bis.1)

To:

see form PCT/ISA/220

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.
PCT/EP2004/009685

International filing date (day/month/year)
30.08.2004

Priority date (day/month/year)
29.09.2003

International Patent Classification (IPC) or both national classification and IPC
C22B19/04, C22B5/16, C22B9/22, C22B4/08, C22B13/02

Applicant
UMICORE

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☒ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA"). However, this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of three months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

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**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/EP2004/009685

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.
 - ☐ This opinion has been established on the basis of a translation from the original language into the following language , which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).
2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:
 - a. type of material:
 - ☐ a sequence listing
 - ☐ table(s) related to the sequence listing
 - b. format of material:
 - ☐ in written format
 - ☐ in computer readable form
 - c. time of filing/furnishing:
 - ☐ contained in the international application as filed.
 - ☐ filed together with the international application in computer readable form.
 - ☐ furnished subsequently to this Authority for the purposes of search.
3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/EP2004/009685

Box No. II Priority

1. ☒ The following document has not been furnished:

☒ copy of the earlier application whose priority has been claimed (Rule 43*bis*.1 and 66.7(a)).


☐ translation of the earlier application whose priority has been claimed (Rule 43*bis*.1 and 66.7(b)).

Consequently it has not been possible to consider the validity of the priority claim. This opinion has nevertheless been established on the assumption that the relevant date is the claimed priority date.

2. ☐ This opinion has been established as if no priority had been claimed due to the fact that the priority claim has been found invalid (Rules 43*bis*.1 and 64.1). Thus for the purposes of this opinion, the international filing date indicated above is considered to be the relevant date.
3. ☐ It has not been possible to consider the validity of the priority claim because a copy of the priority document was not available to the ISA at the time that the search was conducted (Rule 17.1). This opinion has nevertheless been established on the assumption that the relevant date is the claimed priority date.
4. Additional observations, if necessary:

Box No. V Reasoned statement under Rule 43*bis*.1(a)(I) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	1-9, 11
	No: Claims	10
Inventive step (IS)	Yes: Claims	10, 11
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-11
	No: Claims	

2. Citations and explanations

see separate sheet

1. The application relates to a process for recovering metal values from a Zn-, Fe- and Pb-bearing residue whereby the residue is subjected to a flash or agitated bath fuming step, Zn- and Pb-bearing fumes are extracted to valorise Zn and Pb and either one or more of CaO, SiO₂ and MgO are added as a flux in order to obtain a final slag composition as defined through the three inequalities of claim 1. A single-chamber smelting and fuming reactor with one or more plasma tuyeres is also claimed in claim 10.

Through the combination of forced agitation and the claimed slag composition, a rapid fuming process with improved yield and which can be run continuously can be achieved. It is said to be particularly suited for treating neutral leach residue or weak acid leach residue (p.3, l.17-25).

2. Reference is made to the following documents:

D1: US-A-4 415 356

D2: US-A-4 521 245

D3: US-A-4 519 836

D4: US-A-4 571 260

D5: US-A-5 942 023

D1 relates to an autogenous smelting process of sulfide material containing Cu, Ni, Co, Pb, Zn etc. (col.1, l.8-22). The autogenous smelting is preferably done by oxygen flash smelting (claim 2).

D2 relates to flash smelting processing of sulphide Cu or Cu-Zn concentrates where a highly basic molten slag with a maximum of 18 wt% SiO₂ is obtained (abstract).

D3 relates to flash smelting processing of Pb sulfide or Pb-Zn sulfide ores or concentrates where a molten slag with the following compositional requirements is obtained: $(\text{SiO}_2 + \text{Al}_2\text{O}_3)/\text{FeO} = (0.67-1.22)/1$ and $(\text{CaO} + \text{MgO})/\text{FeO} = (0.22-0.75)/1$ (abstract).

D4 relates to a smelting process for recovering metal values from materials containing Sn and/or Zn whereby the slag is vigorously agitated by mechanical, pneumatic or electrical means, preferably by rotating the furnace (col.4, l.30-37). D4 also suggests a slag composition of 20-30% SiO₂, 25-35% CaO, <25% FeO

and 5-10 $\text{MgO} + \text{Al}_2\text{O}_3$ (col.4, l.5-21).

D5 relates to a process for recovering metals from electric arc furnace (EAF) dust, using a reactor with a plasma tuyere as heat and gas sources, whereby the plasma is generated (18) below the slag level (30). Hazardous heavy metals are volatilized (32) (abstract and figure).

3. Process claims 1-9

Documents D1 to D4 show processes using a flash or agitated bath fuming step together with the extraction of Zn- and Pb-bearing fumes. However, none features slag compositions which fulfill the requirements set up in claim 1. Whereas D4 does discuss the fact that the skilled person would select a suitable slag from case to case (col.4, l.5-21), there is no hint in the available prior art to aim at a slag composition as presently claimed.

Consequently, the subject matter of claims 1 to 9 is seen to fulfill the requirements of Art.33(2) and (3) PCT.

4. Apparatus claims 10-11

A single-chamber smelting and fuming reactor as claimed in claim 10 is however known from D5. Consequently, the subject matter of claim 10 is not new (Art.33(2) PCT).

The provision of water-cooled peripheral walls to the reactor claim 10 is not seen as inventive as such are standard in the art in view of the high processing temperatures used. Hence, no inventive step is recognizable for the subject matter of claim 11 (Art.33(3) PCT).